W91321-04-C-0023

LOGANEnergy Corp.

US State Department International Chancery Conclave
PEM Demonstration Project
Initial Project Report

Proton Exchange Membrane (PEM) Fuel Cell Demonstration
Of Domestically Produced PEM Fuel Cells in Military Facilities

US Army Corps of Engineers
Engineer Research and Development Center
Construction Engineering Research Laboratory
Broad Agency Announcement CERL-BAA-FY03

DOS International Chancery Conclave, Washington, DC

November 16, 2004

Executive Summary

Under terms of its FY'03 DOD PEM Demonstration Contract with ERDC/CERL, LOGANEnergy in cooperation with the US State Department (DOS) will install and operate a Plug Power GenCor 5kWe auxiliary fuel cell power plant (see Appendix section 2) at the Administrative Center of the International Chancery Conclave (ICC) in Washington, DC. The ICC is a major real estate development of the DOS to relocate all foreign embassy compounds to one site in order to provide greater security for foreign delegations. The hydrogen powered unit will be electrically configured to provide grid parallel service to selected circuits in the administration building in order to will simulate support of critical or emergency loads so that the State Department may properly evaluate PEM technology. Local electrical and mechanical contractors may be hired to provide services as needed to support the installation tasks. It is anticipated that the project will reduce the facility's energy costs by during the period of performance.

The DOS POC for this project is:
Mr. Richard "Tim" Arthurs
Energy Policy & Conservation Officer
US Department of State
Bus: (202) 647-8970
Bus Fax: (202) 647-1873
E-mail: ArthursRT2@state.gov

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Proposal – Proton Exchange Membrane (PEM) Fuel Cell Demonstration of Domestically Produced Residential PEM Fuel Cells in Military and Federal Government Facilities

1.0 Descriptive Title

LOGANEnergy Corp. Small Scale PEM Demonstration Project at US DOS International Chancery Conclave Administrative Building.

2.0 Name, Address and Related Company Information

LOGANEnergy Corporation

1080 Holcomb Bridge Road
BLDG 100- 175
Roswell, GA 30076
(770) 650- 6388

DUNS 01-562-6211
CAGE Code 09QC3
TIN 58-2292769

LOGANEnergy Corporation is a private Fuel Cell Energy Services company founded in 1994. LOGAN specializes in planning, developing, and maintaining fuel cell projects. In addition, the company works closely with manufacturers to implement their product commercialization strategies. Over the past decade, LOGAN has analyzed hundreds of fuel cell applications. The company has acquired technical skills and expertise by designing, installing and operating over 30 commercial and small-scale fuel cell projects totaling over 7 megawatts of power. These services have been provided to the Department of Defense, fuel cell manufacturers, utilities, and other commercial customers. Presently, LOGAN supports 30 PAFC and PEM fuel cell projects at 21 locations in 12 states, and has agreements to install 22 new projects in the US and the UK over the next 18 months.

3.0 Production Capability of the Manufacturer

Plug Power manufactures a line of PEM fuel cell products at its production facility in Latham, NY. The facility produces three lines of PEM products including the 5kW GenSys5C natural gas unit, the GenSys5P LP Gas unit, and the GenCor 5kW standby power system. The current facility has the capability of manufacturing 10,000 units annually. Plug will support this project by providing remote monitoring, telephonic field support, overnight parts supply, and customer support. These services are intended to enhance the reliability and performance of the unit and achieve the highest possible customer satisfaction. Scott Wilshire is the Plug Power point of contact for this project. His phone number is 518.782.7700 ex1338, and his email address is scott_wilshire@plugpower.com.

4.0 Principal Investigator(s)

Name	Samuel Logan, Jr.	Keith Spitznagel
Title	President	Vice President Market Engagement
Company	Logan Energy Corp.	Logan Energy Corp.
Phone	770.650.6388 x 101	860.210.8050
Fax	770.650.7317	770.650.7317
Email	samlogan@loganenergy.com	kspitznagel@loganenergy.com

5.0 Authorized Negotiator(s)

Name	Samuel Logan, Jr.	Keith Spitznagel
Title	President	Vice President Market Engagement
Company	Logan Energy Corp.	Logan Energy Corp.
Phone	770.650.6388 x 101	860.210.8050
Fax	770.650.7317	770.650.7317
Email	samlogan@loganenergy.com	kspitznagel@loganenergy.com

6.0 Past Relevant Performance Information

a) Contract: PC25 Fuel Cell Service and Maintenance Contract #X1237022

Merck & Company
Ms. Stephanie Chapman
Merck & Company
Bldg 53 Northside
Linden Ave. Gate
Linden, NJ 07036
(732) 594-1686

Four-year PC25 PM Services Maintenance Agreement.
In November 2002 Merck & Company issued a four-year contract to LOGAN to provide fuel cell service, maintenance and operational support for one PC25C fuel cell installed at their Rahway, NJ plant. During the contract period the power plant has operated at 94% availability.

b) Contract: Plug Power Service and Maintenance Agreement to support one 5kWe GenSys 5C and one 5kWe GenSys 5P PEM power plant at NAS Patuxant River, MD.

Plug Power
Mr. Scott Wilshire.
968 Albany Shaker Rd.
Latham, NY 12110
(518) 782-7700 ex 1338

c) Contract: A Partners LLC Commercial Fuel Cell Project Design, Installation and 5-year service and maintenance agreement on 600kW UTC PC25 power block.
Contract # A Partners LLC, 12/31/01

Mr. Ron Allison
A Partner LLC
1171 Fulton Mall
Fresno, CA 93721
(559) 233-3262

5.0 Host Facility Information

The US Department of State International Chancery Center (ICC) administrative building is located in the Northwest Section of Washington DC. The ICC is an alternative to "Embassy Row" along Massachusetts Avenue. It began developing more than 30 years ago, when Congress set aside former National Bureau of Standards land for international use. Located on either side of Van Ness Street the 47 acre site is home to 18 foreign embassies including Israel, Jordon, Kuwait, Singapore, Austria, Bahrain, Bangladesh, Brunei, Egypt, Ethiopia, Ghana, Malaysia, Nigeria, Pakistan, Singapore, Slovakia, the United Arab Emirates and Morocco. China is about to break ground on a complex designed by I.M. Pei. The ICC administrative is a three story building built in 1990, and houses the DOS Office of Protocol, the US Secret Service, and the DOS Office of Foreign Missions. The building has three stories above ground and was built in 1990.

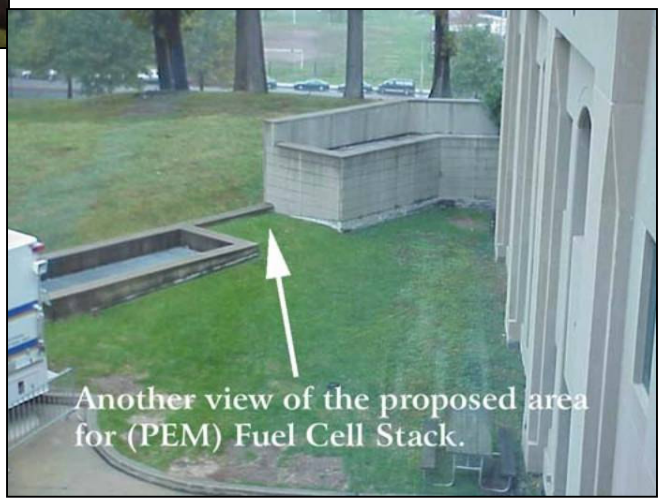
6.0 Fuel Cell Site Information

Do to security concerns and lack of a better option; the northwest corner (rear) of the building was selected as the most desirable location to place the fuel cell pad site. Service access to the ICC building is by way of the driveway on the west side of the building, pictured at left below, which will be convenient for hydrogen deliveries and visitors going out to see the fuel cell.

The pad site will be located just to the left of the white storage container seen in the photo at left.

Conduit runs from the fuel cell will access the below-grade electrical room through the emergency generator ventilation shaft. This run will be less than 75 feet. The electrical room and a one-megawatt diesel powered backup emergency generator are located in the basement on the west side of the building.

The photo below is a close-up view of the fuel cell pad site location.

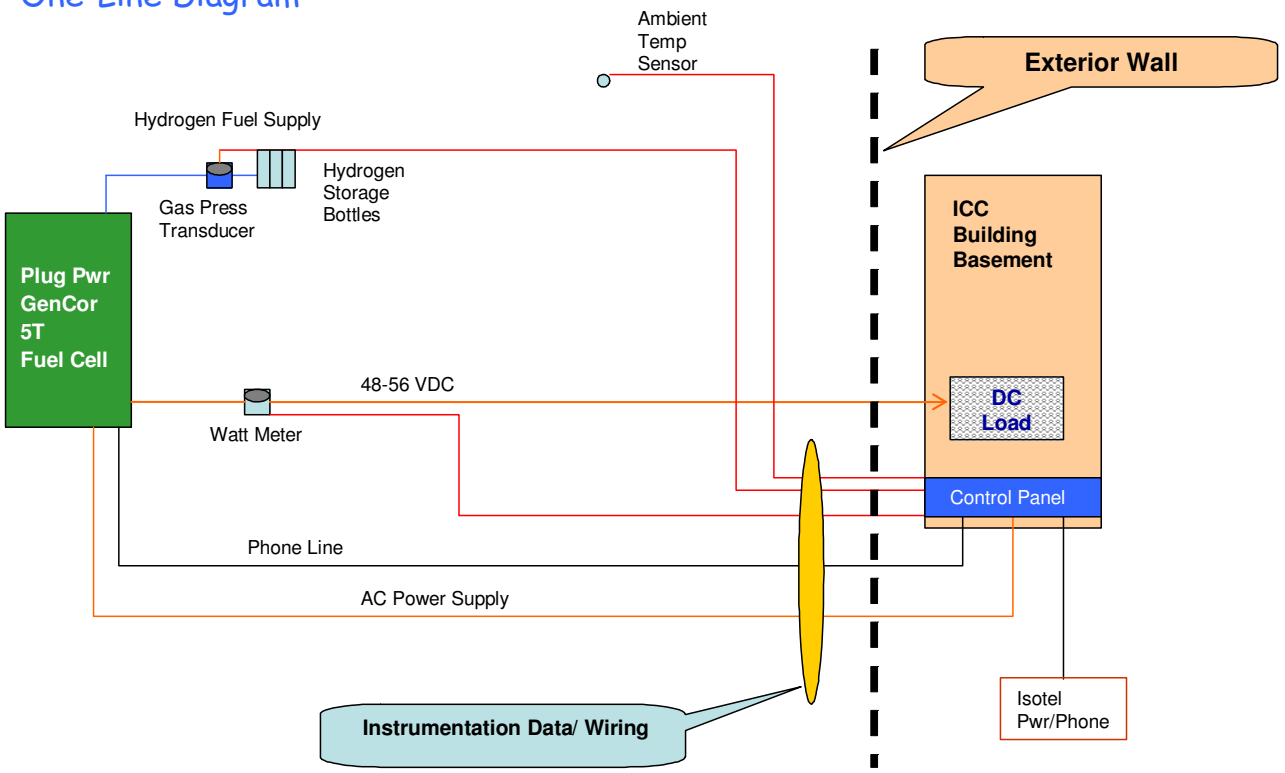


7.0 Electrical System

The Plug Power GenCore™5T is a hydrogen fueled back-up DC power generator (up to 5 kW net output). Hydrogen fuel supply will be stored onsite in a CESM Storage module, and bottled will be provided by a local industrial gas vendor. The standard product application is back-up power for Telecommunications equipment (switching equipment, and other critical loads) in the event grid power is interrupted to the facility. The system will provide positive/negative 48-56 nominal output voltage to a DC bus that will be installed for the test. A small AC power supply will provide power to a programmable duty cycle timer and to the battery recharger in the power plant.

The GenCor performs periodic "conditioning" cycles, automatically, that provide diagnostic/self-check of its controls, subsystems and auxiliary equipment. However, the unit will be programmed to support at least two daily 20-minute operating duty cycles to validate its reliability to support variable and spontaneous load demands. A programmable timer will be used to initiate each test duty cycle. The success of the DOS demonstration project will be based upon the system's ability to respond to at least 90% of the induced duty cycles. The line diagram pictured below illustrates the manner in which the unit will be installed at the ICC Administrative Building.

ICC Admin Building
GenCor Installation
One-Line Diagram



8.0 Data Acquisition

The GenCor controller will record and store operating data including test cycles and kWh provided to the DC load bus. The CESM Hydrogen Storage Module will provide remote monitoring of hydrogen pressure to assist in hydrogen supply logistics. This data will be downloaded remotely each day into a readable format in order to maintain an operating record of the test site. In addition the system will be programmed to send an alarm if it fails any duty cycle or if it experiences any failure requiring service.

9.0 Economic Analysis

DOS ICC Administrative Building

Project Utility Rates						
1) Water (per 1,000 gallons)						
2) Utility (per KWH)						
3) Natural Gas (per MCF)						
First Cost				**Budgeted**	**Actual**	
Plug Power 5 kW GenCor				$ 15,000.00		
Shipping				$ 1,800.00		
CESM Hydrogen Storage Module				$ 5,000.00		
Installation electrical				$ 1,950.00		
Installation mechanical & hydrogen manifold				$ 1,500.00		
Data Interface				$ 650.00		
Site Prep, labor materials				$ 925.00		
Technical Supervision/Start-up				$ 4,500.00		
Total				**$ 31,325.00**		
Assume Five Year Simple Payback				$ 6,265.00	$	-
Forcast Operating Expenses	Volume	$/Hr		$/ Yr		
Hydrogen		$	-	$ 10,800.00		
Total Annual Operating Cost					$	10,800.00
Economic Summary						
Forcast Annual kWH			1825			
Annual Cost of Operating Power Plant		$	5.918	kWH		

10.0 Kickoff Meeting Information

The DOS ICC Administrative building kick-off meeting schedule is being planned at this time. At the meeting Dr. Mike Binder representing CERL and Sam Logan representing LOGANEnergy, will present the scope of the PEM demonstration project and the installation plan to Mr Tim Arthurs and Mr. Walter Whaley, representing the DOS.
Any issues that cannot be resolved at the kickoff meeting will put the commencement of the installation on hold until the DOS POC submits a statement in writing to Dr Binder that the project is ready to begin.

11.0 Status/Timeline

Please see Appendix Section 2 below.

Appendix

Section 1. Product Specifications

Product characteristics			**T**	**B**	**U**
Performance	Net Output[1]	0 to 5,000W	✓	✓	✓
	Adjustable Voltage Output	– 46Vdc to –56Vdc	✓	N/A	N/A
		+46Vdc to +56Vdc	N/A	✓	✓
	Operating Range – Voltage	– 42Vdc to – 60Vdc	✓	N/A	N/A
		+42Vdc to +60Vdc	N/A	✓	✓
	Operating Range – Current	0 to 109 Amps	✓	✓	✓
Fuel	Gaseous Hydrogen	99.95% (dry)	✓	✓	✓
	Supply Pressure	80 psig	✓	✓	✓
	Fuel Consumption	40 slm at 3,000W	✓	✓	✓
		75 slm at 5,000W	✓	✓	✓
Operation	Ambient Temperature	-40C to 46C	✓	✓	✓
	Relative Humidity	0% to 95% non-condensing	✓	✓	✓
	Altitude	-197ft to 6,000ft	✓	✓	✓
Physical	Dimensions	44” x 26”W x 24”D	✓	✓	✓
	Weight	400Lbs	✓	✓	✓
Safety	Compliance	FCC Class A	✓	✓	✓
		ANSI Z21.83	✓	✓	✓
		UL	✓	✓	✓
		Telcordia GR 63, 78,487, 1089	✓	N/A	N/A
Emissions	Water	Maximum 1.75 liters per hours	✓	✓	✓
	Co, CO2, NOx, SOx	<1ppm	✓	✓	✓
	Audible Noise	60dba @ 1m	✓	✓	✓
Sensors	Gas Hazard Sensor		✓	✓	✓
	Pad Shear		Optional	Optional	Optional
	Water Intrusion		Optional	Optional	Optional
	Tampering		Optional	Optional	Optional
Control	Microprocessor w/Diagnostics		✓	✓	✓
	2 LED Alarm Panel		✓	✓	✓
	Communications	RS-232	✓	✓	✓
		Digital Form “C” output	✓	✓	✓
		Modem	Optional	Optional	Optional
		Ethernet	Optional	Optional	Optional

DOS ICC Administrative Building PEM Fuel Cell Demonstration Project

Installation, Monitoring, Performance Evaluations, & Reproting on One Plug Power PEM Fuel Cell

Column Headings Indicate the Beginning of Each Month

Installation Schedule